Origin of the Chesil Bank

IN your report (vol. xi. p. 299) of the paper on this subject by Prof. Prestwich, read at the Institution of Civil Engineers, are these words :—"The large dimensions of the bank he attributed to the great accumulative and small lateral action of the waves." Why, then, does not so general a cause form hundreds of such banks? Why is "the great accumulative action of the waves" confined solely to the Chesil Bank, and particularly to the Portland end of it? Because the travelling of the pebbles is *towards* Portland, which checks the travelling, and so allows of "accumulation" exactly as a groin does. This is the simple "open sesame" of the secret; and if we could build groins as large as Portland, every one of them would "accumulate" a bank of precisely the same conditions as the Chesil Bank. If the pebbles travelled *from* Portland, as the professor thinks, that end of the bank should be the lowest; it would be perpetually robbed by the waves. But it is the highest—forty-three feet; and the Abbotsbury end, to which he supposes the pebbles to travel, should be the highest, but it is the lowest—scarcely more than half the height, twenty-three feet; while at Bridport there should be a still higher bank, for the professor makes the pebbles travel from east to west there and meet the pebbles which had "travelled from the opposite direction, viz., from west to east." But at Bridport there is not a single pebble, but only blown sand.

That the largest pebbles accumulate at the leeward end of beaches is not a matter of opinion, but a matter of fact, and the fact may be *seen* at every groin in the world. So that the large pebbles at Portland, instead of testifying against the travelling from west to east, testify conclusively for it. If there is anyone who can suppose that the diminishing of the pebbles in size from Portland to Abbotsbury results from the wearing in travelling that distance, there can be no one who could give this cause for the same result between two groins. The cause which I have assigned (chapter on "Travelling of Sea Beaches," Rain and Rivers) for the lodgment of the largest pebbles at the Portland end, is that where motion is given to pebbles the largest will be on the outside; they are therefore most amenable to the upward and onward stroke of the wave, and they travel fastest and furthest down wind on these beaches.

With regard to the modern beaches being recompositions of ancient raised beaches, besides the travelling, their pebbles are perpetually pounded by the waves till they are ground into sand. The professor dates the Portland raised beach to the Glacial Period. We have ample time, then, for its pebbles to be ground into sand and replaced by new comers. And the new recruits would not come, as the professor thinks, solely from "the cliffs," but chiefly from the mouths of the rivers which bring pebbles from all the various strata of the interior of the land without the aid of ice; for atmospheric disintegration and the erosion of rain denude the entire surface of the earth, and *let down* to the rivers not only soft soil but hard gravels and stones from every the most remote hill-top. But this huge traffic is brought to the rivers by rain. Rivers are simply the roads which it travels to the sea. What is held in suspension goes out to deep water, but the gravels, stones, and boulders are pounded and ground into the sands of the sea-shore. GEORGE GREENWOOD

Alresford, March 2.

Natural Phenomena in South America

IN Mr. J. Munro's very interesting notes made during a cable-laying expedition from Parà to Cayenne, which were published in NATURE, vol. xi. p. 329, the following passage occurs upon which comment may be useful. After describing a beautifully coloured Crustacean, and an animal which he speaks of as a crab or water-beetle, Mr. Munro goes on to say: "Another creature (Fig. 3) of quite a different description was also picked up. It was more like a water-spider than anything else. Its transparent hair-like limbs were dappled with dull green, and it seemed a mere skeleton framework made to carry a small white sac containing entrails, which was slung underneath." From the figure it is tolerably evident that this creature is one of the Pycnogonidæ, whose place in a classification of the animal kingdom is scarcely yet definitely settled, but which are ranged by Prof. Milne-Edwards among Crustaceans. It seems highly probable, then, that "the small white sac containing entrails" should rather have been described as a pair of very slender legs carrying egg-bags. This at least would be in accordance with what is known of other species of Pycnogons, none of which carry their entrails in sacs slung underneath.

The delicate spider-crab (Fig. 1), which charmed Mr. Munro with its hyaline limbs and varied colouring, seems from the figure to be nearly allied to the genus Stenorhynchus.

The affinities of Fig. 2 cannot be guessed at without additional details.

It is likely enough that all the creatures mentioned may be specifically new. THOMAS R. R. STEBBING

Torquay, March 10

Volcanic Action in the Sandwich Islands

IN your notice of my book, "The Hawaiian Archipelago," (vol. xi. p. 322), you allude to the statement that volcanic action on the Sandwich Islands "has died out from west to east." It has also died out in a *southerly* direction, through nearly four degrees of latitude. In the pit of Hale-mau-mau within the crater of Kilauea, on January 30, 1873, the violently agitated mass of lava continually took a *southward* direction, and broke in very elevated surges upon the cliffs on the *south* side of the lake. On June 4, 1873, when the aspect of the pit had undergone a very great change, there was a violent centripetal action, but the sort of rotating whirlpool continually formed, invariably rotated in a *southerly* direction. Some years ago, during a terrible eruption of Kilauea, when a river of lava from 200 to 800 feet wide, and an estimated depth of twenty feet, was running towards the sea with an estimated velocity of twenty-five miles an hour, four large "fire-fountains" boiled up when the stream issued from the earth. An intelligent observer, Mr. Whitney, noticed that the lava was ejected with a rotary motion, and that both the lava and stones thrown up rotated *towards* the *south*. I should be very glad to know any probable explanation of these phenomena, and if this apparently persistent southerly extinction and motion have any and what value as scientific facts?

Mr. Munro (vol. xi. p. 329) describes the locking together of trees of different species in the neighbourhood of Parà. The instances of this in the Hamakua forest on Hawaii are very numerous and striking. The Ohia (*Metrosideros polymorpha?*) is seen in the closest conjunction with the large tree-fern of the district, with a universality which leads some people of more than average intelligence to assert dogmatically that the fern is the invariable parent of the Ohia! The junction is so intimate as to be *apparent* interpenetration. The greatest height of any tree-fern that I have measured is eighteen feet of caudex; but I have seen Ohias with an estimated height of eighty or ninety feet carry the tree-fern with them to a height of fully thirty feet, the fresh pea-green fronds branching out from among the dark leaves and deep red blossoms of this very handsome evergreen.

6, Alva Street, Edinburgh, March 3 ISABELLA L. BIRD

The Height of Waves

THE height of waves has long been a vexed question amongst all classes of theoretical and practical observers. The late Admiral Fitzroy has left on record that on one occasion the measurement from crest to hollow was seventy feet. The figure seems high, but close and varied observations made during a storm on the passage from Liverpool to New York, in January, convinces me of the correctness of the Admiral's statement. In this storm, for the first time on record, large ocean steamers were rounded to with a fair wind, the universal opinion being that it was too dangerous to run with the sea far on the quarter. The captain of a German steamer, on arriving at New York, spoke in enthusiastic terms of the grand spectacle a White Star steamship presented as she "leaped from wave to wave like a gigantic fish," adding: "I am sure she must have hove to in the end."

This remarkable gale swept over a portion of the Atlantic which the French call "Le trou de diable," and it well merits the designation. Roughly, its focus may be considered to be in 45° N. and 40° W. When the wind sets in strongly from the north-west, the sea rises in an incredibly short space of time; and at the close of a long winter gale it is a grand sight to watch the great waves as they roll up astern at the rate of twenty-five miles per hour, sweep by the ship, and break far ahead. There is a feature in connection with the waves of the Atlantic which is worthy of notice, viz., with a south-west or southerly gale their height is insignificant. A practical proof of this is that large steamers run in the trough of the sea without inconvenience; but with less wind from the north-west they have occasionally to be kept off their course to avoid damage to boats. What occasions this remarkable phenomenon? It cannot be the "fetch," as seamen

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term it, for in some positions the southerly is the longer. Neither can it arise from the lack of force on their part, for they often blow for days at a time, and the total number of foot pounds acting on any particular spot must be enormous. Again, a north-wester during winter or summer tears the surface of the water as if a harrow had passed over it, while the southerly gale leaves no trace behind, save the ordinary break of the crest. These are facts known to everyone who crosses the Atlantic, but no satisfactory explanation of their origin has yet been given.

I give the data from which my observations were made, in order that anyone may draw his own conclusions. This ship is 450 feet long on the upper deck, and the fore yard is 62 feet above the level of the sea. From a position 239 feet abaft the foremast, where the height of the eye was 27 feet, the crests of the advancing waves at times appeared above the fore yard. Estimated distance between the crests of the waves, two-and-a-half times the ship's length.

Celtic, Feb. 13 WM. W. KIDDLE

OUR ASTRONOMICAL COLUMN

VARIABLE STARS.—The following are the dates of maxima and minima of variable stars occurring in April, May, and June, according to the elements of Prof. Schönfeld (1875), stars with short periods being omitted; unless otherwise expressed the date is that of a maximum. The positions of these variables are doubtless in the hands of observers generally.

April 1	T Ursæ Maj., *min.*
1·5	R Bootis, *min.*
2	S Aquarii.
3·6	T Cancri, *min.*
4·5	R Sagittæ, *min.*
8·9	R Vulpeculæ, *min.*
13·8	η Gemin. *min.*
14	R Geminorum.
15·3	S Vulpeculæ, *min.*
17·7	R Scuti.
25·5	S Aquilæ, *min.*
28·7	U Virginis, *min.*
May 3	R Canis Min. *min.*
3·3	R Corvi.
13·6	S Vulpeculæ.
16	S Arietis.
19·2	R Leonis Min.
19·3	S Hydræ.
19·7	U Herculis.
20·1	S Leonis.
May 23·6	R Virginis, *min.*
23·7	R Scuti, *min.*
28	R Sagittarii.
29·4	R Ceti.
31	S Cephei, *min.*
June 1	R Piscium.
1·2	S Ophiuchi.
1·5	T Serpentis.
11·9	R Vulpeculæ.
13·9	R Sagittæ.
15·3	R Leonis.
20	T Cassiop. *min.*
21·8	S Vulpec. *min.*
23·6	R Persei.
24	S Coronæ.
24	R Scorpii.
25	S Herculis, *min.*
27·8	R Scuti.
28·6	R Camelop.

"Linea" communicates the result of his examination of Σ 747 on March 9; the magnitudes appeared to be 7 and 8, as in the last Greenwich Catalogue, the smaller star *s.p.* If "Linea" refers to *Astron. Nach.* No. 2026, he will see from the position there given by Herr Falb for his new variable star, that there is no doubt of its identity with the preceding component of the above double star. It is also No. 10527 in the reduced catalogue of Lalande, and No. 274 in the volume of observations made at the Radcliffe Observatory, Oxford, in 1872, which has been circulated during the last week.

Mr. Birmingham, of Millbrook, Tuam, in *Astron. Nach.* No. 2028, draws attention to a star of 7th magnitude in Monoceros, which he appears to consider new. On Feb. 14, rough measures gave its position in R.A. 7h. 24m. 22s., Decl. 10° 4′ S.; the colour was reddish-yellow. On looking to the sky, it is evident that the R.A. as printed is nearly one minute too great, and the star is identical with Lalande 14599, estimated 1797, Feb. 27, of the 6th magnitude. Lalande's place brought up to the beginning of the present year is R.A. 7h. 23m. 27s·1.; N.P.D. 100° 4′ 12″. The star is entered 6 on Fellöcker's Berlin chart, but is not found in any recent catalogue. In all probability Mr. Birmingham has detected a new variable star. On March 14 it was very little below the 6th magnitude, and, in a hazy sky, had a deep yellow light.

MARS AND 3 SAGITTARII, 1875, JUNE 29.—A very close approach of this planet to the fifth magnitude star 3 Sagittarii will take place during the night of June 29; indeed, with Leverrier's place and adopted diameter of the planet, the star would be occulted for a few minutes by the northern part of the disc, at the Observatories of Cordoba and Santiago de Chile. The phenomenon will not be visible in this country. The much-desired observation of the occultation of ψ Aquarii on the 1st of October, 1672, during Richer's expedition to Cayenne, was lost, through a clouded sky, and from the same cause Rümker, at Paramatta, was prevented observing an occultation of 446 (Mayer) Leonis, on the 16th of February, 1822.

ENCKE'S COMET.—Inquiries arrive from the southern hemisphere with respect to the path of this comet after perihelion passage. The elements determined for the present year, after including the perturbations of Mercury, Venus, the Earth, Mars, Jupiter, and Saturn, are as follows according to Dr. von Asten:—

Perihelion Passage 1875, April 13·06815 G. M. T.

	°	′	″	
Longitude of perihelion	158	13	9	Equinox of 1870·0
Ascending node	334	32	19	
Inclination	13	7	17	
Angle of excentricity	58	8	56	
Mean daily motion	1079″·2209			

The editor of *Astronomische Nachrichten* having notified his intention of reprinting Dr. von Asten's ephemeris, which extends to the middle of August, in his next number, it may suffice to give here a few positions to indicate the general track of the comet. The places are for Berlin noon:—

	R.A.			N.P.D.		DISTANCE FROM	
	h.	m.	s.	°	′	Sun.	Earth.
May 15	0	36	23	105	43·5	0·822	0·564
,, 25	0	8	48	110	31·4	0·995	0·580
June 4	23	41	36	114	43·5	1·156	0·590
,, 14	23	9	54	118	48·6	1·306	0·600
,, 24	22	31	13	122	33·9	1·448	0·619
July 4	21	46	43	125	21·9	1·581	0·659

After Encke's comet is beyond our reach, nearly two years will elapse before any other known comet of short period is visible. Neglecting perturbations, D'Arrest's comet would arrive at perihelion again in the middle of April 1877, but the circumstances would not be favourable for observation.

THE TRANSIT OF VENUS

AS we intimated last week, news has now been received more or less from all the Kerguelen parties. Details of the observations of these and other parties appeared in last Thursday's *Times*, and we shall here endeavour to present the principal astronomical results.

The weather on the island during the transport and after the landing of the various parties was horrible; the day before the Transit was one of the most trying kind, and at night the barometer was falling, and any observations on the morrow seemed hopeless. By a freak of the southern skies, however, on the morning of the 9th the sun rose without a cloud; but a bank began to form soon after sunrise. From the despatch of Capt. Fairfax, of the *Volage*, we learn that at the principal English station "the sky was cloudy and there was little wind. Venus was seen to break into the sun's disc, but before the internal contact a cloud had obscured the sun. Several observations and photographs of the sun were taken during the forenoon, and the internal and external contacts at egress were observed. At the other English stations and at the American stations the contact at ingress, but not at egress, was obtained. The Germans got both contacts at ingress and egress. The astronomers are pleased with their success." From an account of the observations made by the Americans, communicated by one of themselves to the *Capetown Standard and Mail*, and quoted by the *Times*, we learn that, all things considered, their success was great.

"The perfection of the calculations was surprisingly wonderful.

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